

liminary condition leading to a seismic catastrophe, and shows how, if this theory be true, a certain class of earthquakes might be predicted.

Prof. Omori communicated a report on the Messina earthquake, in addition to his report on microseismic waves.

Communications were also made, among others, by Prof. Palazzo, of Rome; M. Angot, of Paris; M. Rosenthal, of Tiflis; M. Choffat, of Lisbon; while Prof. Hecker, of Potsdam, gave an account of his more recent results of tidal displacements in the earth. The meeting concluded with a lecture by Prof. Heim, in which an historical summary of the subject was given from the geologist's point of view.

At previous meetings the desire had been expressed that a complete bibliography of the subject should be published annually; a committee was appointed which reported in favour of coming to an arrangement with the International Catalogue of the Royal Society, all papers on seismology in that catalogue to be joined together in one volume, instead of, or perhaps in addition to, their being classified, as at present, partly under geology, partly under physics, and partly under applied mathematics. There is good ground for believing that such an arrangement could be made, and the meeting adopted the committee's report.

A report on the arrangements for an annual catalogue of earthquakes was presented by Prof. Forel, of Morges. The method to be adopted in such a catalogue, in order to make it most generally useful, gave rise to a good deal of difference of opinion; but after discussion in committee a compromise between different views was effected. Prof. Forel having completed his tenure of office as vice-president, M. Hipites, of Bucarest, was elected to be his successor.

The Federal Council of the Swiss Republic had entrusted the arrangements for the meeting to the Schweizerische Naturforschende Gesellschaft, and, with the assistance of Mr. Seiler, the delegates and their families were cared for in a most excellent manner. At the conclusion of the meeting satisfaction was expressed both at the success of the scientific results, and at the hospitable reception accorded to the members present.

#### BRONZE-AGE INTERMENTS IN SWITZERLAND.

UNDER the title of "Le Cimetière du Boiron de Morges," M. F. A. Forel has issued a report on some remarkable prehistoric interments in Switzerland, and though it occasionally lacks the lucidity of arrangement and grace of style which characterise French work of this kind, it will still be found full of interest.

These interments are attributed to the Bronze age, or, as the author terms it, "le bel-âge du bronze des Palafitteurs." The graves are flat, without mounds or stone pedestals, the latter, he thinks, having been probably replaced by wooden posts which have now decayed. They lie in no definite order or in lines one behind another; nor is there any rule of orientation in the graves themselves. It is remarkable that earth burial and cremation are found side by side; in fact, the two methods of disposal of the dead seem to be contemporary, if the evidence of identity in the style of vases and bronzes deposited with the corpse be accepted as conclusive. It may be noted that M. Forel treats as cases of inhumation those in which the teeth are found intact; those of incineration when the roots of the teeth alone survive. There is nothing in the shape of a regular cist, only a slab laid in a horizontal position over the head and upper part of the body.

NO. 2082, VOL. 81]

The slab graves of this class contained funeral plates and dishes, or piles of urns and bowls, three or four in number, laid one above another. Only one tomb which held a cremated corpse contained a cinerary urn; in the others the bones lay in the mass of charcoal and other remains of the cremation. In such interments only a single corpse was discovered; hence it is supposed that the custom of sacrificing slaves or animals in the belief that their spirits would accompany the dead to the other world did not prevail. There are occasional remains of some kind of coffin; and in the cremation graves the jars probably contained offerings of food to the dead, meat in some cases forming part of such deposits. It is thus obvious that the people who used this cemetery believed in the survival of the spirit after death. M. Forel seems to imagine that this custom of providing food for the dead implies the existence of a sacerdotal class; but this is not confirmed by the analogy of the customs of modern savages, among whom the head of the household or some tribal elder performs the death rites.

The paper is accompanied by photographs of the graves and their contents, and is, on the whole, a useful contribution to our knowledge of the Bronze Age on the continent of Europe.

#### NOTES.

WE learn from the *Pioneer Mail* that the Government of India has issued a resolution concerning malaria in India. The Governor-General has had under consideration a proposal of the sanitary commissioner that a permanent organisation should be formed to inquire systematically into the problems connected with malaria. The number of deaths ascribed to fever throughout India approximates to four and a half millions, representing a mean death-rate of nearly twenty per thousand, and though this total is greatly in excess of the actual figure, owing to the practice of ascribing to "fever" deaths which are in reality due to other causes, yet it has been estimated that the actual death-rate from malarial fever is about five per thousand. The Governor-General has decided to convene a conference to examine the whole question, and to draw up a plan of campaign for the consideration of the Government of India and of the local governments. The conference will assemble at Simla on October 11, and it is expected that it will last about a week. The following is a rough outline of the subjects to be discussed:—(1) the distribution of malaria in India as a whole and in various provinces, with special reference to the sickness and mortality to which it gives rise; (2) the measures of prevention which have been adopted in the different provinces—drainage, mosquito destruction, the distribution of quinine—and the measure of success which has attended each; (3) the improvement of schemes of prevention, including the question of the most suitable form of quinine and the agency by which it can most effectively be distributed.

THE International Aëronautical Congress at Nancy opened on Saturday last, and will conclude to-day. The programme included papers on dirigible airships, on light motors for airships and aëroplanes, on the history of aëroplanes, on cartography, on photographic topography from balloons, on the properties and uses of hydrogen, and on the theory and practice of aërodynamics.

At the Brescia aviation meeting a record in altitude flight was made on Monday last by M. Rougier, who ascended to a height of 198.50 metres (645 feet), as com-

pared with the previous records made by Mr. Orville Wright in Berlin, 172 metres, and M. Latham at Rheims, 155 metres.

THE following is a list of the awards made in connection with the Brescia aviation meeting:—grand prize of Brescia (international) for a speed test over 50 kilometres: 1st, Mr. Curtiss, 2nd, Lieut. Calderara, 3rd, M. Rougier; Modigliani prize (international) for height: 1st, M. Rougier, 2nd, Mr. Curtiss; prize for carrying passenger (international): Lieut. Calderara; prize for starting in shortest time: 1st, Mr. Curtiss, 2nd, M. Leblanc; world's record for height: M. Rougier; Oldofredi prize (national) for 1 kilometre: Lieut. Calderara; prize given by the *Corriere della Sera* (national) for 20-kilometre flight: Lieut. Calderara; King's cup: Lieut. Calderara. The gold medal given by the King has been awarded to Buzio and Restilli, the engineers who constructed the Rebus engine of Lieut. Calderara's machine.

AVIATION meetings, according to the *Times*, are to take place at Johannisthal, Berlin, from September 26 to October 3, and at Issy-les-Moulineaux, near Paris, from October 30 to November 1.

ACCORDING to a New York correspondent of the *Times* great damage to property and some loss of life has been caused in the neighbourhood of the Mexican Gulf by a hurricane. On September 21 the waters of the Gulf and of the Mississippi were reported to be still rising, and trains were water-bound in many places.

THE thirteenth annual fungus foray of the British Mycological Society will be held at Baslow, Derbyshire, from Monday next until the following Saturday. In the evening of Wednesday the president of the society—Prof. M. C. Potter—will deliver an address on bacteria in their relation to plant pathology, and on Thursday Prof. R. H. Biffen will read a paper on the Laboulbeniaceæ, and Mr. A. D. Cotton will present some notes on new or critical British Clavarize.

THE Allahabad *Pioneer Mail* announces that an agricultural association is in course of formation in Poonah which has as its object the development of agriculture in the Deccan. The programme of work laid down by the promoters is a large one. It embraces an annual show in one of the Deccan districts, the publication of up-to-date agricultural information, chiefly, if not entirely, in the vernacular, the encouragement of better cattle breeding, the pressing of the importance of agricultural education, especially in the vernacular schools, and many other departments.

IN connection with the Hudson-Fulton celebration (September 25 to October 9), a list has been issued by the committee of the celebration commission of the museums, institutions, and societies which have prepared free exhibitions relating to Henry Hudson, Robert Fulton, and the history of steam navigation; paintings, objects of art, archaeological specimens, and other things relating to the three centuries of New York's history; the discovery of the Hudson River and the introduction of steam navigation; plants, fish, and animals indigenous to the Hudson River valley.

AN expedition, consisting of members of the Utah Archaeological Society, is reported to have made important discoveries along the Colorado River, in northern Arizona and southern Utah. The most important is a natural bridge, which spans 274 feet and is more than 300 feet high. On the top of it several fossils of remarkable size were found embedded.

NO. 2082, VOL. 81]

ACCORDING to *Science*, the palaeontological expedition of the University of Chicago to the Permian of northern Texas has returned from a successful trip. Numerous skulls and skeletons of small reptiles and amphibians were secured, giving to the University of Chicago, with its previous collections from that formation, an excellent representation of Permian vertebrates.

MR. HENRY ADAMS has been elected president of the Association of Engineers-in-Charge, in succession to Mr. James Swinburne, F.R.S.

LIEUT. SHACKLETON has been invited to deliver a lecture on October 9 before the Danish Royal Geographical Society.

DR. E. A. WILSON, who served under Captain R. F. Scott in that explorer's former Antarctic expedition, has accepted the post of medical officer for the projected expedition of Captain Scott to the South Pole.

QUESTIONED as to the truth or otherwise of the statement that he was to lead an expedition to the Antarctic regions, Commander Peary has replied:—"My work in the field of either the Arctic or the Antarctic is at an end, although my services will always be available if desired in promoting organisation or other work in those regions."

THE death of Mr. Bryan Cookson has robbed astronomy of one who, during but a short life, had already achieved much, and who gave promise of still further advancing our knowledge of that science. Mr. Bryan Cookson was a son of the late Mr. N. C. Cookson, of Wylam-on-Tyne. He was educated at Harrow, and at Magdalen College, Oxford. After some time spent in travelling he took up his residence at Cambridge, where he designed a new form of floating photographic zenith-telescope for the purpose of making original investigations on change of latitude and the constant of aberration. Later he worked for two years at Cape Town under Sir David Gill, His Majesty's astronomer at the Royal Observatory, Cape of Good Hope, and some of his results were published in a paper on the determination of the mass of Jupiter and the elements of the orbits of the satellites of that planet. On his return to Cambridge he erected his zenith-telescope, with which he continued his observations, many of which still await publication. About a year ago Mr. Cookson was appointed assistant at the Cambridge Observatory. He was a man of the highest character and of singular charm of manner, and his death, at the comparatively early age of thirty-six, is keenly felt amongst a large circle of acquaintances.

THE death is announced of Mr. T. Currie Gregory, a civil and mining engineer who was concerned in the building of the Great Western Railway of Canada, now merged in the Grand Trunk line.

THE death is announced, at the age of seventy-four, of Mr. Peter Barr, well known as a horticulturist, to whom in 1897 the Victoria medal of honour was awarded by the Royal Horticultural Society.

AN exceptionally cool September is being experienced this year, and the entire absence of really warm days is very unusual. At Greenwich during the first twenty-two days of the month the thermometer has only once exceeded 70°, the absolutely highest reading being 71°. The mean of all the maximum day temperatures is 64°, which is 5° below the average, and the mean of the minimum night temperatures is 48°, which is 2° below the average, the mean result for the first three weeks being 3.5° below the average. During the corresponding period last year there

were six days with the shade temperature above 70° at Greenwich, and in 1907 there were nine such warm days, whilst in 1906 there were as many as eleven days with the thermometer above 70°, and on each of the first three days the shade temperature exceeded 90°. The rainfall for September is so far generally somewhat below the average, and the duration of bright sunshine is about normal. During the greater part of the period the United Kingdom has been under the influence of a region of high barometer readings, and this has warded off very greatly the inroad of cyclonic disturbances from the Atlantic.

WE have received from the editor (Dr. Ziegeler, Spandau Jagowstrasse 4) a copy of the *Wochenschrift für Aquarien- und Terrarien-kunde*, containing several articles of interest. The chief of these refers to the successful importation into Germany from Mexico of that rare Cyprinodont fish *Xiphophorus*, so called on account of the pointed process borne on the caudal fin of the male. A good description is given of the habits and appearance of both sexes. Notes on the common viper, on the reproduction of the frogs and toads of Germany, and sketches of fishing and of hunting make up an attractive number. In a covering letter the editor points out that his *Wochenschrift* is international in scope, and he invites those who are interested in the cult of the aquarium to assist him in realising this object by contributing to its pages. The subject is not merely one for amateur fanciers, but is capable of forwarding research in genetics.

THE second number of vol. ii. of "Memoirs of the Indian Museum" is devoted to the first portion of an account of the Indian Cirripedia Pedunculata, by Dr. N. Annandale, the stalked barnacles of the family Lepadidae, in its modern restricted sense, forming the subject of this section. The collection of Indian cirripedes of this group in Calcutta is unusually rich both in the matter of species and individuals, and since it has been supplemented by specimens from various European museums Dr. Annandale has had before him a wealth of material which ought to render his monograph well-nigh complete. In the author's opinion, the primitive cirripede was provided with a large number of calcareous plates or valves, and from this ancestral type evolution has taken place along several lines, both as regards the structure of the internal parts and the various appendages, and as regards the valves. In each division occur partially parasitic types in which the valves have undergone more or less complete degeneration.

To the September number of the *Popular Science Monthly* Dr. H. S. Colton contributes a specially interesting article on Peale's Philadelphia Museum. Charles Willson Peale, who was born in 1741, was at first a portrait-painter, but about the year 1785 set about the formation of a natural-history museum, which was, indeed, opened in Philadelphia, with the addition of grounds where a certain number of live animals were kept. In the exhibition-cases Peale attempted, with the aid of artistically painted backgrounds, to show his zoological specimens amid their natural surroundings, a practice which, after long disuse, has of late years come into favour in museums on both sides of the Atlantic. Peale's greatest achievement was the recovery and reconstruction of the first skeleton—or rather two skeletons—of the American mastodon. In the spring of 1801 Peale was informed that the bones of a mastodon had been discovered in a marl-pit near Newburg, in New York State, and he proceeded to the spot and purchased from the owner for 300 dollars the bones already disinterred, and the right

to drain and excavate the morass for the purpose of endeavouring to recover the remainder of the skeleton. With the aid of pumps and other machinery lent by Government, the recovery of the missing bones was successfully carried out, and the skeleton, lacking the lower jaw and part of the crown of the skull, was eventually mounted, with additions in wood of the missing parts, from a second skeleton obtained in the neighbourhood and likewise mounted. These skeletons are noticed by Cuvier in his memoir on the great mastodon. At the sale of the Peale Museum in 1850 the second skeleton was probably bought by P. T. Barnum, and, if so, may have been burnt in the destruction of his museum by fire in 1851. The first skeleton, after having been taken by Peale and his brother to London in 1803, where it was exhibited before the Royal Society, eventually found a home in the American Museum of Natural History at New York, where it is known, from having been in the museum of the latter city, as the Baltimore mastodon.

IN the *Journal of Morphology* for July (vol. xx, No. 2) Mr. O. P. Dellinger makes an interesting contribution to the discussion on the physical structure of protoplasm. There is still, in spite of the elaborate researches of Bützschli and others, much difference of opinion on this question. The present author makes the cilium the starting point of his investigations, and brings forward evidence to show that all contractile protoplasm has a fibrillar structure. He demonstrates, in an apparently satisfactory manner, that the cilia of *Styloynchia* are composed of spirally coiled fibrils, and that the flagella of *Euglena*, *Chilomonas*, and *Spirillum* consist each of four spiral filaments, which will account for the complexity of their movements. He finds that by using those methods and reagents by which cilia are best preserved it is possible to demonstrate the existence of a finely meshed reticulum in *Amoeba*, and maintains that such a reticulum of contractile fibres would explain all the facts of amoeboid movement. Osmic acid appears to be the most satisfactory reagent for fixing the contractile structures investigated.

AN investigation of the epiphytic mycorrhiza that invests the roots of *Monotropa Hypopitys* forms the subject of a paper contributed by Dr. J. Peklo to the *Bulletin International*, Prague (1908). He points out that there is a marked difference between the amount of mycorrhiza investing *Monotropa* roots in clay or humic soils, and that specimens in clay soils may be entirely free from the fungal covering. As is generally known, the fungus penetrates only into the epidermal cells, and for this reason is termed epiphytic. The plant secretes tannin products in these cells, which serve, in the author's opinion, to prevent the fungus from penetrating further within the root.

THE first of an announced series of pamphlets providing information on special Indian timbers deals with the timber yielded by *Diospyros Kurzii*, and known as Andaman marble or zebra wood. As the name implies, the wood is streaked in bands ranging from black to a brownish or pinkish grey, and it has been described as one of the handsomest timbers in the world. The pamphlet, compiled by Mr. R. S. Troup and published by the Government of India as Forest Pamphlet No. 7, supplies details regarding the qualities, available size, and amount of timber; it also contains an actual specimen of the wood.

ARISING out of an inquiry addressed to the director of Kew Gardens, Dr. O. Stapf supplies in the *Kew Bulletin* (No. 7) an article on the identification and properties of

the wood known as "lignum nephriticum," which was regarded some three centuries ago as a valuable remedy for disorders of the bladder and kidneys; it was also known that an infusion of the wood was fluorescent. This property, together with a reference to the Mexican vernacular name "coatl," provided the clue to its identification as the product of the leguminous tree *Eysenhardtia amorphoides*. A chemical examination to ascertain the principles which give the wood its physical and possible therapeutical qualities is postponed until more material is available. Another determination by the same authority refers to the fodder grass which is making a reputation in Australia and Natal as *Phalaris commutata*, but which should be known as *Phalaris bulbosa*.

WE have received a copy of "The Problem of Practical Eugenics," a lecture delivered by Prof. Karl Pearson at the Galton Laboratory for National Eugenics. Prof. Pearson directs attention to the falling birth-rate, particularly in a manufacturing city like Bradford, and the conclusion is arrived at that this is due mainly to factory legislation, which has destroyed the economic value of the child. A Bradford doctor assured him that in the days before the Factory Acts more care was taken of the children on this account. Prof. Pearson says "the mistake of most legislation is that it is carried by appeal to the sentiment and feelings of relatively small classes—the cultured and highly sensitive upper and middle classes. The biological and economic bases of life are disregarded, and the result is only manifest twenty or thirty years later. The whole trend of legislation and social action has been to disregard parentage and to emphasise environment." Various suggestions are offered to remedy this effect while still maintaining factory legislation. The lecture is one which should be carefully studied by the educated public and our legislators who have the well-being of the race at heart.

AN important report, by Prof. W. J. Simpson, on the general state of sanitation and of public health in the West African colonies, has been issued by the Colonial Office. Prof. Simpson was sent to the Gold Coast with special reference to an outbreak of plague which occurred in Accra and the surrounding district in January, 1908. The outbreak lasted for six months; there were 344 cases with 300 deaths. Preventive inoculation was resorted to with conspicuous success, and was performed on 35,000 persons without a single accident or ill-effect. The general insanitary conditions existing in the colony are described by Prof. Simpson as being fraught with danger to the community. No real, effectual, and steady campaign against malarial fever in West Africa has yet been begun. There are no mosquito brigades maintained throughout the year, and it is no one's special duty to look after and to be responsible for the public health. No real progress is possible except by the formation of an organised health department completely distinct from the existing medical service of the colonies, and charged with the duty of advising the Government concerning improvements, and of seeing that they are effectively carried out. Owing to the absence of such a department towns are suffered to grow up from villages without any forethought, the result being often an insanitary condition that nothing but costly demolition will remedy. The report sketches an outline of the organisation and composition of the proposed sanitary service, and discusses its relations with the existing West African medical staff and with the Government.

THE Bulletin of the Sleeping Sickness Bureau (No. 9) contains résumés of a number of papers on trypanosomes and sleeping sickness. Dr. Moffat reports on a sleeping-

sickness-like disease in Bechuanaland. He concludes that the disease closely resembles sleeping sickness, but if it is this disease it is probably imported, and not indigenous.

THE craniometrical evidence from India, which is at present scanty and in various respects unsatisfactory, has been usefully supplemented by the publication of the measurements of a series of skulls deposited in the Indian Museum, Calcutta, which have been carried out by Mr. B. A. Gupte under the supervision of Dr. Annandale. The collection contains 614 specimens, but many are broken and others do not indicate the caste or tribe of the subjects. Besides this, practically all come from the lowest strata of the population, from jails and hospitals, the more respectable members of the community being invariably cremated. The record is also vitiated by the impossibility of segregating the skulls of emigrants from other parts of India who happened to die in eastern India. These records, therefore, afford no safe basis for generalisation, but they may be useful to supplement measurements of the living subject, which are necessarily less trustworthy than those of skulls, because it is easier to arrange the position of the latter, and because the soft tissues of the head and face exhibit much individual variation and capacity for contraction and expansion. Mr. Gupte has good reason for appealing to persons throughout India who are in a position to collect skulls, the *provenance* and records of which can be accurately determined, to supplement the present collection, which is of little value for the classification of the multitudinous races and castes to be found within the Indian Empire.

THE first annual report (1908) of the Liverpool Committee for Excavation and Research in Wales and the Marches, which has its headquarters in the Liverpool University Institute of Archæology, and is closely associated there with the School of Celtic Studies, contains valuable preliminary surface surveys and detailed reports of tentative excavations at the Roman camps of Chester and Caerleon. The discovery of a Palæolithic implement at the former site is of special interest. A list of the relative number of coins found at Caerleon indicates an occupation of the camp in, or soon after, the principate of Vespasian. Mr. Evelyn-White adduces literary evidence pointing to occupation under Claudius. Two excellent plans of the camp have, apparently, a true north bearing, though the fact is not stated, for the orientation indicated is about  $51^{\circ}$  N.W.-S.E., which on paper is near enough to the theoretical azimuth for the district of sunrise at the winter solstice. In the preliminary surveys of cromlechs there is not a single reference to their orientation, and the subject has yet to be formally recognised by a committee which, as the list shows, represents all the archæological societies of Wales and the Marches.

DR. GEORG VON SMOLENSKI, of Cracow, contributes to *Petermann's Mitteilungen* (v., p. 101) an interesting study of the causes of the asymmetrical form of the north-and-south river valleys in Galicia, which are characteristically steeper on the eastern side than on the western. A careful examination of the different theories which have been proposed from time to time leads Dr. von Smolenski to conclude that no single hypothesis can account for all the observed facts, and he divides the valleys into two groups, those in which the asymmetrical form is being developed and extended at the present time, and those in which it remains as the result of a former condition no longer in existence. In the first group the asymmetry is due to the normal action of "Hilber's law," the base-level of each tributary of the master stream (the Dniester) being lower than that of the tributary next it to the westward. The

second group is found to be due to the action of wind, and must have been formed at a time when the prevailing winds of the region were east and north-east. It appears independently that the formation did actually take place in late Pleistocene times.

THE report of the Meteorological Committee for the year ended March 31 presents several points of especial interest. The various publications containing statistical results have been grouped together under the title "British Meteorological Year-book"; it appears strictly up to date, which will be a great advantage with regard to the supply of information to inquirers, the number of whom have much increased in recent years. Several publications on interesting subjects are in course of preparation. The 7h. a.m. international service of telegraphic weather reports, which was brought into operation on July 1, 1908, has been found to work satisfactorily, and since the commencement of the present year the reports by radio-telegraphy hitherto received from H.M. ships have been supplemented by wireless telegrams from Atlantic liners. The observations and accuracy of transmission have been satisfactory, but only a small number of the messages were received in time for current use, and much remains to be done before they can be utilised in a day map of the ocean. The weather forecasts issued in the morning newspapers and those issued during the harvest season (June-September) have been very successful, the percentage of accuracy (complete and partial) amounting to 92 and 96 respectively. The committee contemplates making some important modifications in the practice of the office as regards marine observations. Instead of devoting attention almost exclusively to the compilation of average results, it is proposed to compare the current with the mean values. Monthly outline charts in suitable form, with the mean values of various elements, are being prepared as the ground-work for plotting the observations recorded on voyages. By this means it is hoped eventually to trace the meteorological relationships of changes in different parts of the world.

THE *Physikalische Zeitschrift* for September 1 contains a long illustrated article by Dr. Max Iklé on old and new little-known auxiliary apparatus for use in physical and chemical laboratories. The pieces of apparatus mentioned are taken from the catalogues of nineteen German firms of instrument makers, and are well worthy of the attention of instrument makers in general. Of special interest are the funnel holder of bent wire, the small instrument stand of adjustable height, the metal lens holder of the Schuster and Lees type, the Bunsen burner with the gas inlet at the side so as not to be stopped up by fused salts falling down the tube, the "emaille" insulated connecting wire for electrical work, and, finally, the list of monographs dealing with cements for physical and chemical work.

THE well-known paradox of twisting a strip of paper and joining its ends in such a way as to form a surface with only one face and only one edge gives rise to the cubic surface known as Möbius's surface. This is, in fact, a surface generated by a straight line which revolves about a point in its plane through an angle of  $180^\circ$ , while the plane revolves about a straight line in itself through  $360^\circ$ . A discussion of the properties of this surface, by Prof. C. E. Cullis, forms one of the papers in the first number of the new Bulletin of the Calcutta Mathematical Society.

THE Calcutta Mathematical Society has commenced the issue of a Bulletin which promises to be an important addition to our mathematical periodicals. In addition

to original papers it contains a "summary of principal mathematical journals," with abstracts of many papers; a section headed "Societies and Academies," with full list of titles of papers read; "Reviews"; "Notes and News"; a bibliography of "New Publications," together with proceedings of the society itself, and lists of members and of books in the society's library. While the new bulletin thus assumes the cosmopolitan character of its American contemporary, several of the features which characterise it are distinctly new. The journal should fill a want which is felt no less by English than by Indian mathematicians. We had almost forgotten to mention another commendable feature—there are no "problems and solutions."

A PAPER on the liquefaction of clay by alkalis and the use of fluid clay casting in the ceramic industry, by Dr. E. Weber, which formed the subject of an interesting demonstration at the International Congress of Applied Chemistry, appears in full in German and in English in the eighth volume of the *Transactions of the English Ceramic Society*, before which society the paper had previously been read. The author shows that by the addition of a suitable quantity of alkali a stiff clay, containing not more than a normal quantity (15 to 20 per cent.) of water, can be made quite fluid; on pouring into plaster moulds the water and alkali are drawn out, and the clay quickly sets. The addition of the alkali does not affect the properties of the finished material, provided that it is only used in moderation, and the use of plaster moulds tends still further to neutralise its effects. In addition to the saving of labour-charges, it is claimed for the casting process that, by completely disintegrating the clay, it gives a very dense and uniform product free from all defects, and that when porous materials are admixed with the clay these become thoroughly impregnated, giving an absolutely dense, homogeneous, and strong mass. The method is in use on a considerable scale for the manufacture of glass furnaces, muffles for zinc distillation, gas retorts, and sanitary goods, as well as smaller articles. The same volume contains a description of a new casting machine, by J. G. Roberts, which is claimed to work with less manual labour than those previously in use, and to have an output of forty-five dozen articles per hour. The society is to be congratulated on the initiation of a series of abstracts from pottery journals, of which a first instalment, covering forty pages, and dealing with twenty journals, is now published.

THE Parseval airship has recently passed the stipulated tests, and has been accepted by the Prussian War Office. The conditions laid down were capability of remaining at a height of about 5000 feet for more than ten hours, of landing at any specified place, and, in addition, capability of being quickly taken to pieces, transported by rail or by two-horse vehicles, fixed up, filled again, and started from any place. At the trials the airship actually kept afloat for  $11\frac{1}{2}$  hours. We learn from a description in *Engineering* for September 10 that the ship has a cigar-shaped body about 190 feet long, and has a maximum diameter of about 31 feet. The balloon is charged with hydrogen, and has sufficient rigidity imparted to it by a slight excess of gas pressure—0.8 inch of water. To produce and maintain this gas pressure two *ballonets* or air-sacks have been provided within the balloon; these are charged with compressed air at a pressure of about  $1\frac{1}{4}$  inch of water, and this supply is controlled by means of a system of valves. The motor develops from 100 horse-power to 120 horse-power, and the petrol tank contains nearly 100 gallons.

Few present-day engineers are aware that Watt produced a steam tilt hammer some years before Nasmyth designed the type of hammer that bears his name. The works at Soho held at one time a great reputation for coppersmith work, and this class of work was done with a Watt tilt hammer, which continued to be in use until quite recently. A photograph of the hammer, together with many others showing machines used by Boulton and Watt, appears in an article in the *Engineer* for September 10. In examining the illustration of one of the Soho boring machines, we are reminded of Watt's early troubles in boring his cylinders—on one occasion we find him rejoicing over a finished cylinder which was nowhere more than  $\frac{1}{8}$ -inch from true circularity. We agree with our contemporary that it is greatly to be deplored that the history of machine tools has not been preserved. The ingenuity which has produced the development of machine tools has contributed in no small degree to the rise and progress of mechanical engineering.

A CONSIDERABLE extension of our knowledge of the electrical strength of air has been made by Mr. E. A. Watson, of the University of Liverpool, who has measured the potential difference necessary to cause a spark to pass between two small metal spheres at various distances apart in air at pressures between one and fifteen atmospheres. His paper, and the discussion which arose on it, will be found in the August number of the *Journal of the Institution of Electrical Engineers*. From it we gather that air compressed to fifteen atmospheres will stand an electrical stress of 40,000 volts per millimetre, and it is to be hoped that this fact will soon find its application in apparatus in which high insulation is required.

*Erratum.*—In *NATURE* of September 16, p. 339, second column, line twenty-two from bottom, the word satisfactory should be unsatisfactory. The sentence should read:—"With a sextant and artificial horizon, a low altitude, such as  $10^{\circ}$  or  $11^{\circ}$  or below, is very unsatisfactory."

#### OUR ASTRONOMICAL COLUMN.

**HALLEY'S COMET.**—From a Central News telegram published in Monday's *Daily Telegraph*, we learn that Prof. Burnham has obtained two photographs of Halley's comet, with instruments at Yerkes Observatory.

**OBSERVATIONS OF PERRINE'S COMET, 1909b.**—A further observation of Perrine's comet, made by Dr. Max Wolf on September 5, is recorded in No. 4355 of the *Astronomische Nachrichten* (p. 179, September 12). With the reflector, and a power of 140, the comet appeared as a round, nebulous mass, of about  $10'$  diameter, increasing in intensity towards the centre. The brightness of the whole comet is about equal to the fourteenth magnitude, while the nucleus is about equal to a star of that magnitude.

Dr. Ebell gives an ephemeris for this comet in the same journal showing that it should become about  $1.5$  magnitudes brighter than it is at present by October 17. The observation of September 5 shows that this ephemeris then required corrections of  $-1m. 39s.$  and  $-23'$ .

**OBSERVATIONS OF MARS.**—In No. 4354 of the *Astronomische Nachrichten* (p. 159) M. Jonckheere gives a drawing illustrating his observation of August 11-12. The peculiar interest of the observation was the aspect of the Novissima Thyle, which, although still covered with ice, was detached from the polar cap. This feature of the Martian landscape appeared oval, with its broad extremity in long.  $330^{\circ}$  and its narrow end in long.  $310^{\circ}$ , its apparent length being  $1.42''$ .

Measures of the polar cap show that its apparent diameter decreased from  $4.33''$  on July 16 to  $3.00''$  on August 21.

NO. 2082, VOL. 81]

Further changes are recorded by M. Jarry Desloges in No. 4355 of the same journal. Observations made with a 37-cm. refractor on the Revard plateau on September 3 showed that the white polar spot was divided completely by a crevasse and a greyish region in long.  $80^{\circ}$ . The region of the Lacus Solis and d'Auroræ Sinus, so pale during the previous rotations, showed considerable changes, the details now appearing very different in form, colouring, and position to what they did in 1907. Juvente Fons is dark and easily visible, and the canal Coprates appears to have changed its position since 1907. Nectar is dark and broad, and Araxes is double and very complicated in its structure. Lacus Phoenicis is blackish and is doubled, the southern portion being the smaller. Lacus Tithonus has very indefinite edges, and two dark spots are seen within its area. The Solis Lacus presents a number of detailed features, and is much elongated in the direction east-west. A number of canals, single and double, were observed, and all the regions observed presented such a complicated structure that it was found impossible to make complete drawings.

**WATER VAPOUR IN THE MARTIAN ATMOSPHERE.**—According to a despatch published in the *Times* of September 17, spectrograms of Mars and the moon, secured by a party of Lick observers on the summit of Mount Whitney, indicate that there is no appreciable quantity of water vapour in the Martian atmosphere. Prof. Campbell suggests that the positive results obtained by Prof. Lowell and other observers may be attributable to water vapour in the earth's atmosphere, but further details should be awaited ere the recent negative results are accepted as final. The photographs are stated to have been taken when Mars and the moon were at the same altitude, and under similar conditions of the earth's atmosphere, yet the vapour bands in the Martian are no stronger than in the lunar spectra; hence it follows that, at the time the spectra were obtained, the quantity of water vapour on Mars was apparently no greater than that on the moon.

**THE MAXIMUM OF MIRA IN OCTOBER, 1908.**—Dr. Nijland's observations of the magnitude of Mira, made at the Utrecht Observatory during the period July, 1908, to February, 1909, showed that the maximum (mag. =  $3.5$ ) occurred on October 6, 1908 (J.D. 2418221), five days before the time given by Guthnick's ephemeris (*Astronomische Nachrichten*, No. 4355, p. 165).

**THE SPECTROHELIOGRAPH OF THE CATANIA OBSERVATORY.**—In an extract from vol. xvii. of the *Rendiconti della R. Accademia dei Lincei*, Prof. Riccò describes the spectroheliograph now in use at the Catania Observatory, the first to be erected in Italy.

The instrument is made to attach to a telescope, and may be used with a prismatic, or a grating, dispersion. The regulation of the transit of the primary slit across the solar image is effected by a clepsydra containing water with 20 per cent. of glycerine added. The diameter of the solar image operated upon is 52 mm., but the primary slit is but 37 mm. long, therefore the whole disc takes two exposures. Some of the results obtained at Catania, in 1908, are reproduced with the paper, which is also printed in No. 8, vol. xxxviii., of the *Memorie della Società degli Spettroscopisti Italiani*.

**H $\alpha$  IMAGES ON SPECTROHELIograms.**—In concluding a letter to the *Observatory*, M. Deslandres states that, on spectroheliograms taken in H $\alpha$  light at Meudon, he has, this year, noted numerous instances where the spectro-register of velocities has revealed some very large radial displacements, similar to those observed by Young in 1872 and Hale in 1892. These were thought to be exceptional phenomena, but Mr. Buss, who calls them "horns," claims that he has seen them with relative frequency. The Meudon observations now confirm Mr. Buss's ocular observations.

**DOUBLE-STAR MEASURES.**—In Nos. 4353-4 of the *Astronomische Nachrichten*, Prof. Burnham continues the record of the observations of double stars made since the publication of his General Catalogue. The majority of measures refer to doubles otherwise neglected, and comparatively few of the  $\Sigma$  or  $O\Sigma$  are considered to require present attention. About 150 systems are included in the list of measures now published.